Chapter – 14
STATISTICS

HANDOUT(Module 3 of 4)

Median of Group Data

Median

The median is the middle value of a distribution *i.e.*, median of a distribution is the value of the observation which divides it into two equal parts.

- **Median of ungrouped data:**

  (*i*) Arrange the data in ascending order.

  (*ii*) If n (number of observations) is odd, then median $= \left(\frac{n+1}{2}\right)^{th}$ observation.

  (*iii*) If n (number of observations) is even, then median $= \frac{1}{2}\left[\left(\frac{n}{2}\right)^{th} \text{observation} + \left(\frac{n}{2}+1\right)^{th} \text{observation}\right]$

- **Median of grouped data:** Median of a grouped data or continuous frequency distribution can be found by using the formula:

$$\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$$

where l = lower limit of the median class
n = number of observations
f = frequency of the median class
h = size of the median class (assuming all class sizes to be equal)

Ex-1 The distribution below given the marks of 30 students of a class in mathematics. Find the median marks of the students

Marks	40-45	45-50	50-55	55-60	60-65	65-70	70-75
No of Student	2	3	8	6	6	3	2

Solution.

Marks	*Number of students* (f_i)	*Cumulative frequency* (*cf*
40–45	2	2
45–50	3	5
50–55	8	13
55–60	6	19 → median class
60–65	6	25
65–70	3	28
70–75	2	30
Total	$\Sigma f_i = 30$	

$\Sigma f_i = n = 30, \frac{n}{2} = 15$

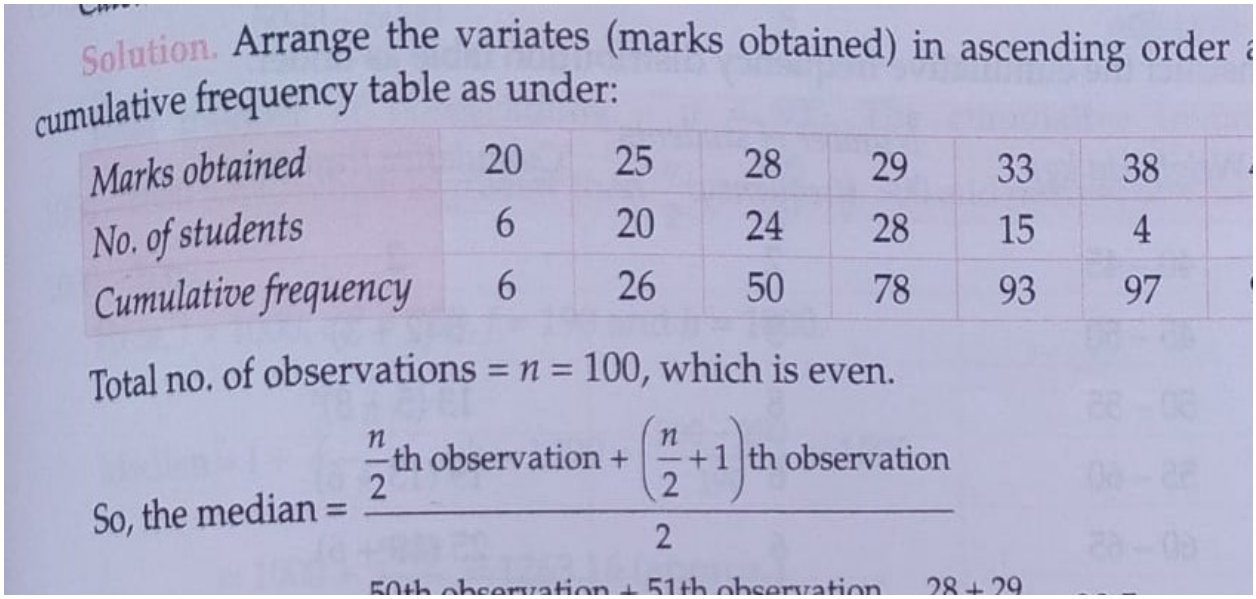
Since *cf* just greater than $\frac{n}{2} = 15$ is 19.

$\therefore$ The corresponding class is 55–60 which is the median class.

n ... $cf = 13$ $f = 6$ $h = 5$

Ex-2 In a unit test, the marks obtained by 100 students (out of 50) are given below

Marks Obtain	20	29	28	33	42	38	43	25
No of Student	6	28	24	15	2	4	1	20



Solution. Arrange the variates (marks obtained) in ascending order a
cumulative frequency table as under:

Marks obtained	20	25	28	29	33	38
No. of students	6	20	24	28	15	4
Cumulative frequency	6	26	50	78	93	97

Total no. of observations = $n = 100$, which is even.

$$\text{So, the median} = \frac{\frac{n}{2}\text{th observation} + \left(\frac{n}{2}+1\right)\text{th observation}}{2}$$

50th observation + 51th observation 28 + 29

Ex-3 If the median of the distribution given below is 28.5 find the value of x and y

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	total
Frequency	5	x	20	15	y	5	60

Solution. Here, median = 28.5, $n = 60$

Class interval	*Frequency* (f_i)	*Cumulative freq*
0–10	5	5
10–20	x	$5 + x$
20–30	20	$25 + x$
30–40	15	$40 + x$
40–50	y	$40 + x +$
50–60	5	$45 + x +$
Total	$\Sigma f_i = 60$	

median class is 20–30

$$\therefore \quad \text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h \Rightarrow 28.5 = 20 + \left(\frac{30 - (5 + x}{20} \right.$$

$$\Rightarrow \quad 28.5 = 20 + \frac{25 - x}{20} \times 10 \Rightarrow 28.5 = 20 + \frac{25 - x}{2} \Rightarrow$$